GaN growth temperature measurement

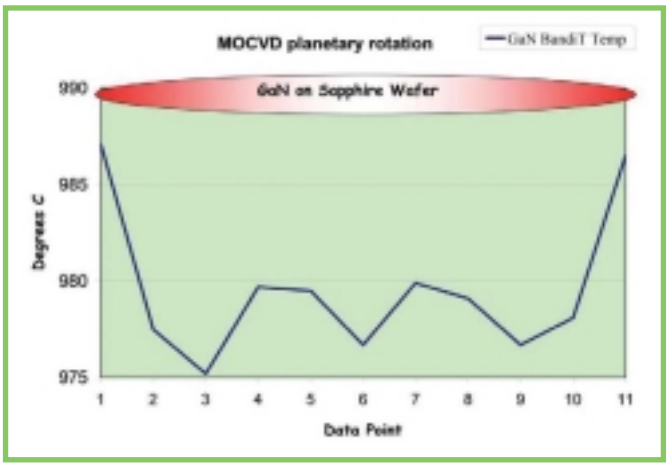
k-Space Associates Inc has developed a new optical temperature monitoring system, the kSA BandiT, that directly measures the temperature of GaN and SiC-based films commonly grown by MOCVD or MBE.

According to the company, all current forms of GaN/SiC temperature measurement, including emissivity-corrected pyrometers (ECPs), rely on technology that only measures black body radiation from the susceptor or heater behind the sample. However, the company says, this approach does not allow for direct temperature measurement of the sample, intrawafer temperature variations, or real time GaN surface temperature fluctuations.

The new kSA GaN BandiT system directly measures a fundamental material property of semiconductors, namely the temperature-dependent bandgap. By monitoring the absorption edge of the material (which is directly related to the band gap), it is claimed that direct temperature measurement is possible for GaN and SiC, through 1300°C.

"The most attractive material systems for today's compound semiconductor applications are GaN and SiC. Surprisingly, all current forms of temperature measurement have been unable to directly and reproducibly measure the temperature of the film," noted Darryl Barlett, k-Space's general manager.

"Our new kSA GaN BandiT is like having a 'virtual thermocouple' on the wafer surface during growth, enabling new temperature information with the promise of accelerating device performance."



kSA GaN BandiT measuring spatially-resolved wafer temperature during multiwafer MOCVD growth.

kSA GaN BandiT is not affected by changing view port transmission, stray IR light sources, reactor maintenance or system emissivity changes. Configurations are now available for most commercial single and multi-wafer MOCVD and MBE systems.

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